WHAT IS CLAIMED IS:

1. A doped ring amplifying optical fiber (1) comprising:

- a single-mode core (10) of given diameter d1; and

- a multimode core (20) surrounding the single-mode core and containing a doped layer (21) referred to as a "doped ring", having a certain concentration (c1) of active rare earth ions (6), the fiber being suitable, because of the active rare earth ions, for amplifying an optical signal (s_u) for injection into the amplifying fiber;

the fiber being characterized in that it is of a length and has Raman efficiency such that the product of said length multiplied by said Raman efficiency is greater than or equal to 0.5 W^{-1}, and in that, for said fiber presenting absorption for an injected optical signal (s_u) due to the presence of active rare earth ions, said absorption being defined by an absorption coefficient expressed in dB/m and presenting a maximum value as a function of the wavelength of said signal, which value is referred to as the absorption maximum, said fiber presents accumulated absorption, corresponding to the product of said length multiplied by said absorption maximum, which is greater than or equal to 100 dB.

2. An amplifying optical fiber (1) according to claim 1, characterized in that said length is short enough for said amplification by said active rare earth ions to enable gain of not less than 1 dB.

3. An amplifying optical fiber (1) according to claim 1 or claim 2, characterized in that the absorption maximum is less than or equal to 1 dB/m and the length is greater than or equal to 100 m.

4. An amplifying optical fiber (1) according to claim 1 or claim 2, characterized in that the Raman efficiency is greater than or equal to 3 $W^{-1}km^{-1}$.

5. An amplifying optical fiber (1) according to claim 1 or claim 2, characterized in that said doped ring presents an inner radius (r_i) greater than 1.5 μm.

6. An amplifying optical fiber (1) according to claim 1 or claim 2, characterized in that the concentration (c1) of active rare earth ions is selected to be lower than or equal to 1000 ppm, and when the rare earth ions (6) are erbium ions, to be lower than or equal to 300 ppm.

7. An amplifying optical fiber (1) according to claim 1 or claim 2, characterized in that the single-mode core (10) having at least a first refractive index (n1) and the multimode core (20) having at least a second refractive index (n2), the difference between the first and second refractive indices (n1, n2) is greater than or equal to 0.01.

8. An amplifying optical fiber (1) according to claim 1 or claim 2, characterized in that the diameter (d1) of the single-mode core (10) is selected to lie in the range 3 μm to 5 μm.

9. An amplifying optical fiber (1) according to claim 1 or claim 2, characterized in that the single-mode core (10) is based on silica or on fluoride glass and is doped by dopants (5) selected from phosphorous, germanium, tellurium, aluminum, and boron.

10. An amplifying optical fiber (1) according to claim 1 or claim 2, characterized in that the rare earth doped ring is based on silica or fluoride glass and is doped by

additional dopants selected from the following compounds: Li_2O, Na_2O, K_2O, Rb_2O, Cs_2O, BeO, MgO, CaO, SrO, and BaO.

11. An amplifier (100) for amplifying an optical signal (s_u), the amplifier comprising:

- a doped ring amplifying optical fiber (1); and
- a multimode pump (2) coupled to said fiber perform amplification by active rare earth ions,

the amplifier being characterized in that the amplifying optical fiber is as defined in any one of claims 1 to 10, and in that it includes at least one single-mode pump (3) coupled to the amplifying optical fiber to perform Raman amplification in addition to said amplification by the active rare earth ions.

12. An amplifier (100) according to claim 11, characterized in that the wavelength of the single-mode pump (3) is selected to enlarge the gain spectrum obtained by the active rare earth ions.

13. An amplifier according to claim 11, characterized in that the wavelength of the single-mode pump is selected to lie in the range of wavelengths in which gain is obtained by the active rare earth ions.